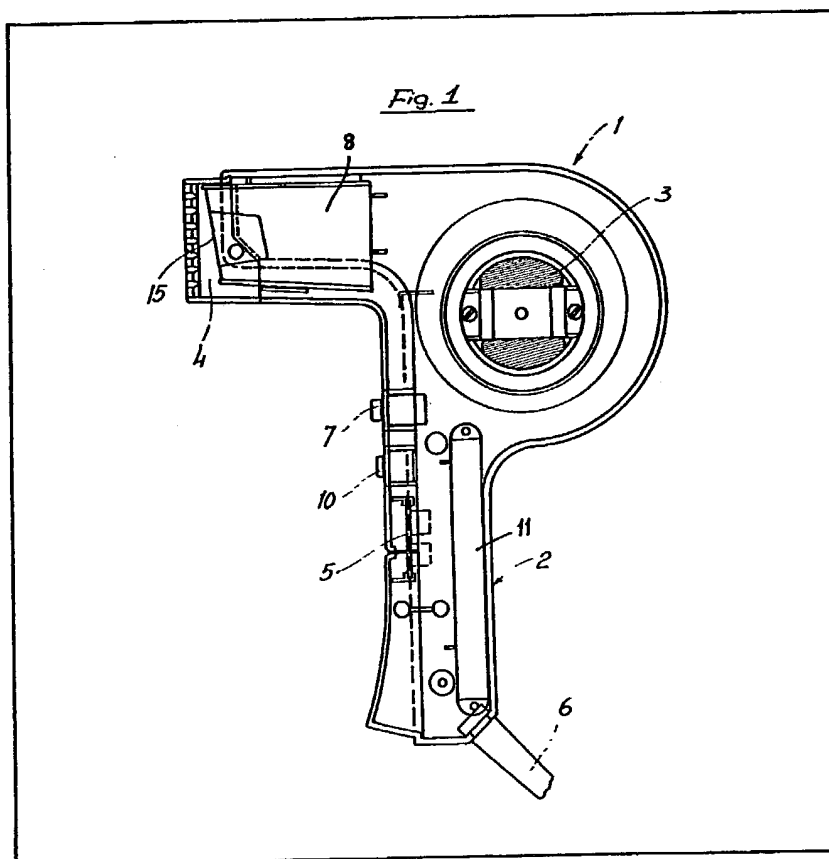


- (21) Application No 8041172
(22) Date of filing 23 Dec 1980
(30) Priority data
(31) 19178
(32) 11 Jan 1980
(33) Italy (IT)
(43) Application published
22 Jul 1981
(51) INT CL.³
A45D 20/00
H01T 19/04
H05F 3/04
(52) Domestic classification
A4V 29D
H1X 5D 5E
(56) Documents cited
GB 2023351 A
GB 1192941
GB 1106187
GB 392873
(58) Field of search
A4V
(71) Applicant
Ivano Pedrini,
Via dei Mille, 22, San
Giuliano Milanese
(Milan), Italy
(72) Inventor
Ivano Pedrini
(74) Agents
E. N. Lewis & Taylor,
144, New Walk,
Leicester, LE1 7JA

(54) Hair-drier provided with a device for dissipating electrostatic charges

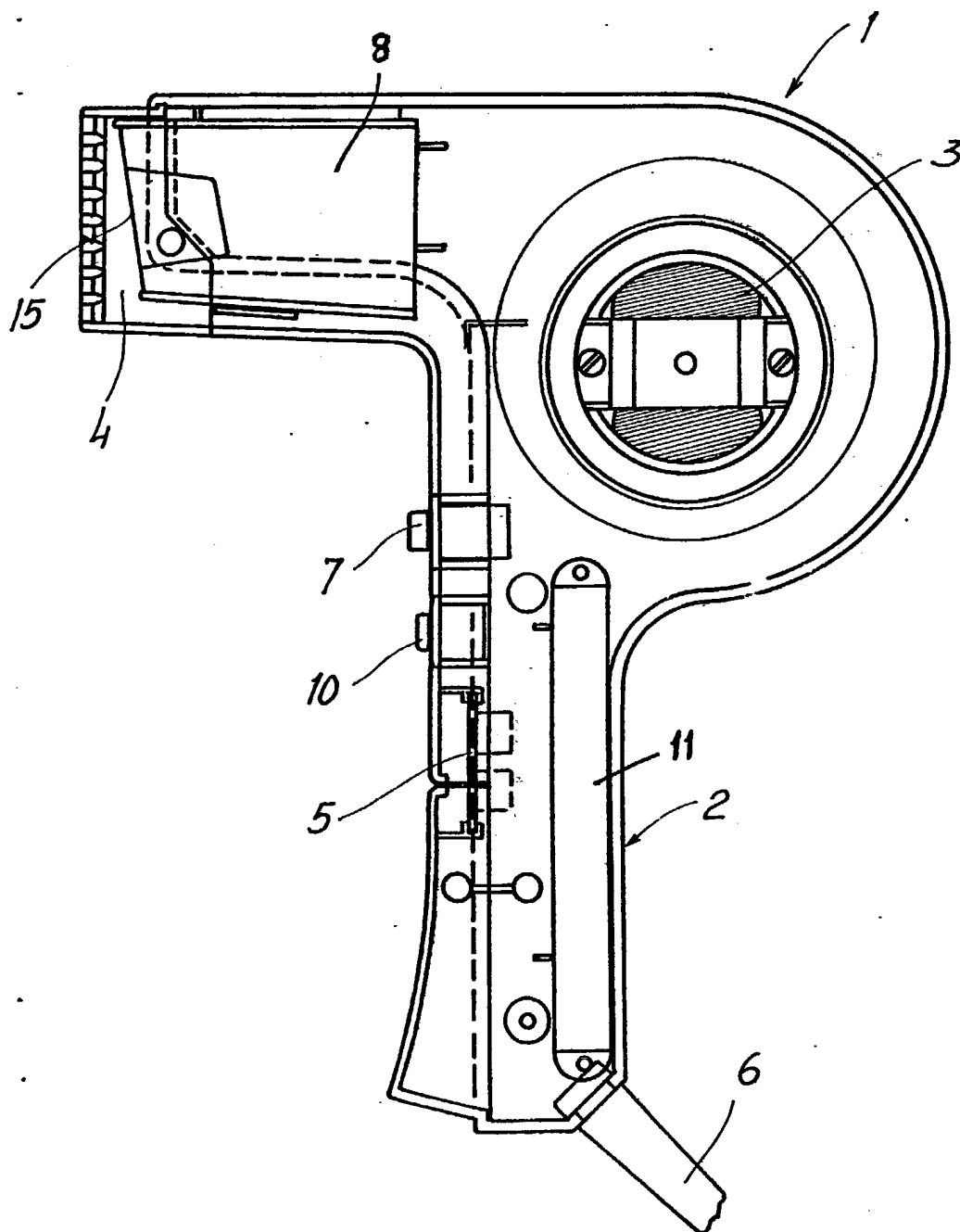
(57) A hair-drier, provided with a device for dissipating electrostatic charges, comprises a box-like housing (1) provided with a handle portion (2), a motor-fan assembly (3) housed in the box-like housing and effective to generate an air flow at the hair-drier dispensing mouth or outlet (4) and an electronic ionizing circuit (11) electrically connected to an ionizing point or star member (15), located at the air dispensing mouth (4) and effective to provide a predetermined polarity continuous ion flow.



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Fig. 1



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Fig. 2

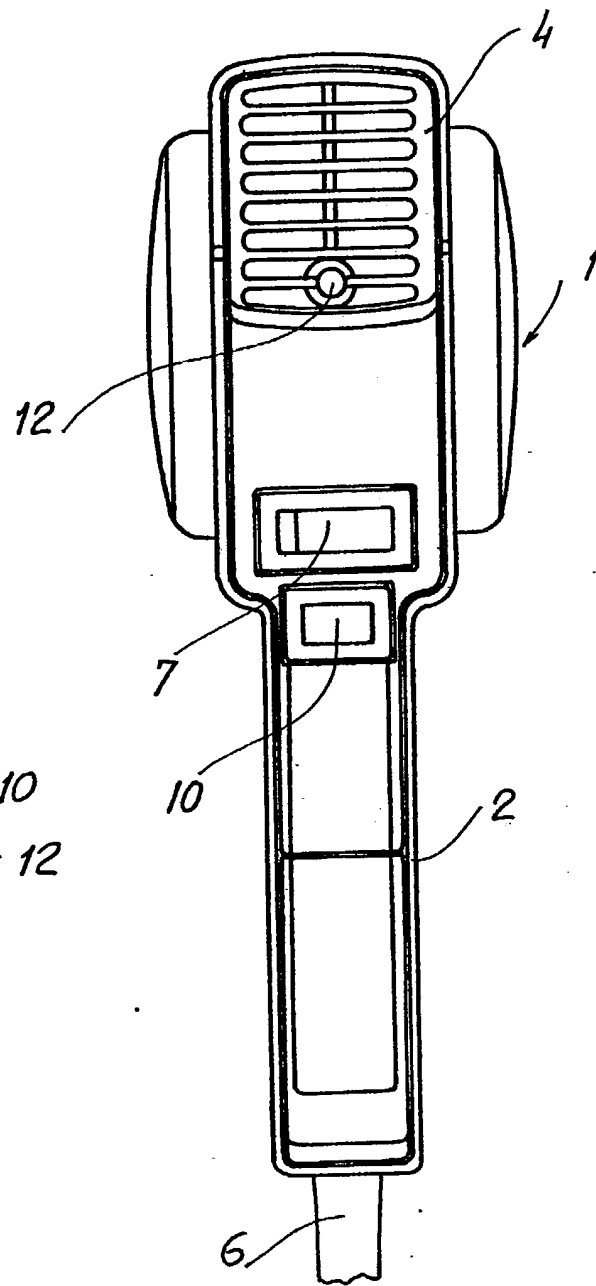
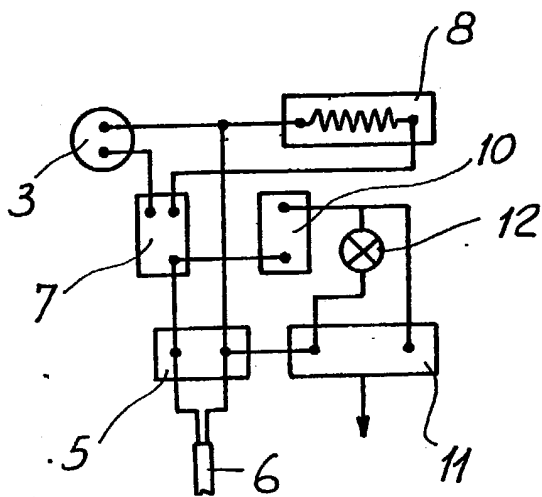


Fig. 3



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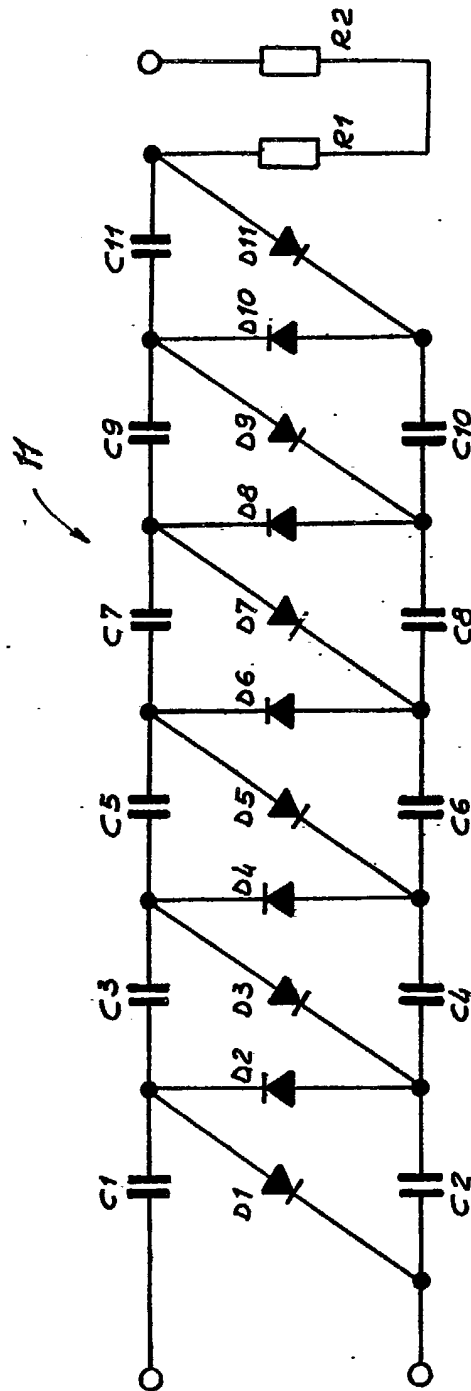


Fig. 4

SPECIFICATION

Hair-drier device for dissipating electrostatic charges

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The present invention relates to a hair-drier, provided with an electrostatic charge dissipating device.

As it is known, there are many materials which, upon rubbing, tend to charge with electrostatic charges, which can cause troubles of several types.

Thus, for example, in the case of photographic films and phonographic discs, the electrostatic charges, as they are present, tend to draw the dust which settles on the surface thereby damaging said surface. Furthermore the dust can hardly be removed.

In the specific case of the hair, the presence of the electrostatic charges originates a repulsion effect which prevents the hair to remain in place, and cause troubles as it is desired to comb the hair.

To obviate these drawbacks several devices have been constructed which are mainly based on the use of piezoelectric elements effective to provide gaseous ions having, alternatively, an opposite sign polarity.

Practically, in the piezoelectric devices of known type, there is provided a non continuous flow of electric charges, equal and of opposite polarity, with a continuous flow and reflow of the charges in such a way that the resultant algebraic sum of said charges is zero.

In fact, during the pressing step of the piezoelectric pads, a certain amount of ions is emitted, having a given polarity, while during the subsequent releasing step an approximately equal ion emission occurs, these latter ions being of opposite polarity.

The provision of a piezoelectric type of device does not solve, in the practice, the problem thereinabove cited since it presents the drawback of requiring that a rather intricate mechanical structure is to be provided for operating the piezoelectric pad.

Furthermore, another serious drawback consists of the fact that the piezoelectric pads, which, as it is known, are obtained by using suitably located quartz crystals, are subjected to loose their mechanical characteristics.

In fact the quartz crystals, upon prolonged use, tend to disgregate, thereby losing their piezoelectric properties.

The present invention sets out to obviate the drawbacks thereinabove indicated, by providing a hair-drier including a device for dissipating the electrostatic charges and effective to provide a continuous flow of ions, which can have a fixed polarity, with a predetermined charge, depending on the specific needs.

Within that aim, it is further possible to arrange that the hair-drier comprises an ion generating device free of any mechanical operating members, thereby simplifying its structure and providing, moreover, the possibility of constructing a very reduced size element of easy and quick installation.

It is further possible to arrange that the hair-drier comprises an ionizing device which, being free of any mechanical pressing actions, is of very great

duration and practically free of any types of wear.

It is further possible to arrange that the hair-drier according to the present invention is highly-reliable and of great safety in its use and harmless for the user.

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It is further possible to arrange that the hair-drier, provided with a device for dissipating the electrostatic charges, can be easily constructed starting from easily commercially available elements and materials and, furthermore, be highly competitive from an economic point of view.

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According to one aspect of the present invention there is provided a hair-drier, provided with a device for dissipating the electrostatic charges, characterized in that it comprises, in combination, a box-like housing provided with a handle portion, a motor-fan assembly housed in said box-like housing and effective to generate an air flow at the dispensing mouth or outlet, an ionizing electronic circuit, electrically connected to an ionizing point or star member, located in said dispensing mouth, and effective to generate a predetermined polarity continuous ion flow.

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Further characteristics and advantages will

become more apparent from the following detailed description of a preferred, though not exclusive, embodiment of a hair drier, provided with an electronic device for dissipating the electrostatic charges, being illustrated indicatively and not limitatively in the accompanying drawings, where:

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fig. 1 is a schematic elevation view illustrating the hair-drier according to the invention, a portion of the box-like housing thereof being omitted;

fig. 2 is a front elevation view illustrating the hair-drier according to the present invention;

fig. 3 illustrates an operating electric diagram of the hair-drier;

fig. 4 illustrates a functional electric circuit of the ionizing device.

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Referring now to the number references of the aforesaid figures, the hair-drier, provided with the electronic device for dissipating the electrostatic charges, according to the present invention, comprises a housing of box-like shape, indicated generally by the reference number 1, which has the conventional configuration of a hair-drier and defines, in the lower portion thereof, a handle zone or portion, indicated by the reference number 2.

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In the inside of the box-like housing 1 there is provided an electric motor 3, provided with a fan, which can be of any type and arrangement and which acts to convey the air flow toward the dispensing mouth or outlet 4 of the hair-drier.

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As it is better shown in the figures 1 and 3, in the inside of the handle portion 2 there is provided a bipolar post or terminal 5, which is connected to the two-wire cable 6 for the connection to the mains.

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One end of the bipolar terminal 5 is connected to a bipolar switch 7, one output thereof is connected to said motor 3, while the other output is connected to a thermoprotected resistor 8 which, in turn, is connected to the motor 3.

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Furthermore, from the bipolar terminal 5 a connection departs which couples the motor 3 downstream of the resistor 8, thereby affording the possibility of

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using, at will, either the single motor 3 or, possibility, the motor 3 in combination with the resistor 8, as it will be described in a more detailed way thereafter.

From the input terminal of the unipolar switch 7 there extends a duct, controlled by a push-button 10 which supplies one end of an electronic ionizing circuit 11, connected, at the other end thereof, and directly, to the input bipolar terminal 5.

Moreover a signalling lamp 12 is provided, in parallel with said electronic ionizing circuit 11, which lamp acts to signal the insertion or energizing of said electronic ionizing circuit 11.

This latter is electrically connected to an ionizing point or star member, indicated schematically at 15, and located at the hair-drier dispensing mouth or outlet.

A main feature of the present invention consists of the electronic ionizing circuit, which affords the possibility of generating a continuous flow of ions, having a fixed polarity, with a predetermined charge, which permits to completely dissipate and rather quickly, the electrostatic charges which can originate in the hair or possibly on photographic films, phonographic discs or other like elements.

The ionizing circuit, which is illustrated in fig. 4, affords the possibility of obtaining from an alternating voltage of maximum value E_m , a d.c. voltage of nE_m value, n being an integer number, without using a step-up transformer, but simply diodes and capacitors, as suitably connected one to another.

According to a specific example of practical use, the input voltage of the ionizing circuit may be of 220 V C.A., corresponding to the usual mains voltage, while, at the output, it is possible to obtain a D.C. voltage of 3.5KV.

From an examination of the circuit it should be noted that it consists of a plurality of capacitors, indicated at C1, C2, C3 C10, C11 which are located in two branches.

More specifically, on a branch there are provided the odd numerated capacitors, while on the other there are provided the even numerated capacitors.

The aforesaid capacitors are electrically connected to one another by means of a link circuit, formed by diodes indicated at D1, D2 D11, which are so arranged as to provide a cascade connection of the several capacitors.

More specifically, the diodes D1, D3, D5, D7, D9 and D11 are connected downstream of the capacitors, of corresponding number, and upstream of the capacitors bearing the next number.

Furthermore, they are so poled as to provide for an electric current flow toward the capacitor bearing the greater number.

The diodes D2, D4, D6, D8 and D10 are connected downstream of the capacitors of corresponding number and upstream of those bearing the next number.

At the end of the electronic circuit, formed by the aforesaid capacitors and diodes, there is provided a protecting resistor, formed by the resistors R1, R2, in series relationship.

From experimental carried out tests it has been found that, by providing at the output of the electronic circuit a needle-like diffusing member, it is

possible to obtain a negative ionizing, due to the effect of the impact of the encompassing air molecules.

Owing to their like polarity, these ions mutually repel and, depending on the field distribution, diffuse through the encompassing space, as aided by the air emission, which is generated by the fan of the motor (3).

More specifically, the ion migration is very apparent in the sensible ion wind, near the emitting point or needle.

From experimental tests, it has been found that, by applying two needle-like diffusing members at the negative output potential or voltage, 1,600,000 negative ions per cm^3 have been measured at a distance of about 20 cm^3 from the sucking manifolds of the device.

It should be noted that there is not any potential danger for the user, even due to a direct contact with the output potential during the operation of the circuit.

In fact, the high voltage source may be approximately considered a charged capacitor C, storing the following power amount:

$$W = \frac{V^2 \times C}{2} = \frac{(3.5 \times 10^3)^2 \times \frac{0.01 \times 10^{-6}}{11}}{2} = 5.5 \text{mW}$$

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From experimental tests it has been found that only charge powers of the order of 10,000mW are dangerous for the man, whereas the ionizing device according to the invention operates at power levels which are infinitely less.

In order to limit the transient phenomena, in a case of a short, between the output and the ground there is provided a resistor of 20-22 mohms.

At the direct contact of the output to the ground the voltage source completely discharges through the protecting resistor, in a time:

$$t = 5 \times T = 5 \times R \times C = 5 \times 22 \times 10^3 \times 6.9 \times 10^{-9} = 0.1 \text{ sec}$$

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Accordingly, at the contact, there will flow a maximum current of:

$$I_{\text{max}} = \frac{V_0}{R} = \frac{3.5 \times 10^3}{22 \times 10^3} = 0.159 \times 10^{-3} = 0.16 \text{mA}$$

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The output voltage of the source goes to zero in a very short time.

Since the high voltage cascade connection is, for a given time, yet subjected to the mains voltage, a residue voltage remains at the source output which, through the shorted circuit portion $R=0$, causes a negligible current to flow, which latter is determined by the protecting resistor and by the high inner resistance of the source.

This current is absolutely innocuous for the user.

In fact it is greatly smaller than the standard international rule allowable current of 25mA through 500 ohms, as permitted for the electromedical stimulat-

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ing apparatus.

The operation of the hair-drier according to the invention is of great simplicity and, on the other hand, it will be obvious through an examination of the above description.

In fact, the hair-drier according to the invention can be used as a conventional hair-drier.

To this end, there is provided the possibility of using only the motor with the related fan 3 to generate a cold air flow or, alternatively, of connecting also the resistor 8, by operating the unipolar change over switch 7.

Since said resistor 8 is located at the dispensing mouth or outlet, it acts to preliminarily heat the emitted air.

On the other hand, the main characteristic of the invention consists of the provision of the ionizing device, which is operated in an easy manner, since it is sufficient to operate the push-button 10 to connect the electronic circuit illustrated in fig. 4.

This circuit, as thereinabove described, provides a continuous flow of ions, which are of fixed polarity and have a predetermined charge.

The emitted ions act to dissipate the possibly present electrostatic charges, since they are effective to neutralize said charges in very short times.

Furthermore, the operation of the push-button 10 causes the energizing of the signalling light member, consisting of the light 12.

From the above description it should be noted that the invention fully achieves the intended objects.

More specifically, it is to be pointed out the great simplicity of the device according to the invention which replaces the conventional intricate and inefficient piezoelectric devices with a highly reliable and practical circuit, of simple operation and of practically unlimited duration.

Moreover an important aspect, which makes the device according to the invention different from the known types of piezoelectric devices, consists of the fact that ions are emitted of one single polarity, contrarily to an alternate polarity as it occurs in the known piezoelectric devices.

The invention as described is susceptible to many modifications and variations all of which fall within the invention scope.

In practicing the invention the used materials as well as the specific size and shapes can be any, depending on the needs.

50 CLAIMS

1. A hair-drier, provided with a device for dissipating the electrostatic charges, characterized in that it comprises, in combination, a box-like housing provided with a handle portion, a motor fan assembly housed in said box-like housing and effective to generate an air flow at the dispensing mouth or outlet, an ionizing electronic circuit, electrically connected to an ionizing point or star member, located in said dispensing mouth, and effective to generate a predetermined polarity continuous ion flow.

2. A hair-drier, provided with a device for dissipating the electrostatic charges, according to the preceding claims, characterized in that it comprises, at said dispensing mouth, a thermoprotected resistor electrically connected to said motor and to an

unipolar switch, effective to select the operation of said motor and/or the operation of said motor and an air-heating resistor.

3. A hair-drier, provided with a device for dissipating the electrostatic charges, according to the preceding claims, characterized in that it comprises, in parallel relationship with said electronic ionizing circuit, a light signalling unit, effective to signal the operation of said electronic ionizing circuit.

4. A hair-drier, provided with a device for dissipating the electrostatic charges, according to one or more of the preceding claims, characterized in that it comprises a push-button, provided on said box-like housing, for electrically connecting an electronic ionizing circuit to the supplying mains.

5. A hair-drier, provided with a device for dissipating the electrostatic charges, according to one or more of the preceding claims, characterized in that said electronic ionizing circuit comprises a voltage multiplier, effective to transform an alternating voltage into a d.c. voltage as multiplied by coupling diodes and capacitors.

6. A hair-drier, provided with a device for dissipating the electrostatic charges, according to one or more of the preceding claims, characterized in that said electronic ionizing circuit comprises a plurality of capacitors, located on two branches, effective to be connected to the electric supplying mains and connected one to another by links, thereon said diodes are connected.

7. A hair-drier, provided with a device for dissipating the electrostatic charges, according to the preceding claims, characterized in that it is of the helmet type or any other type and comprises in combination the electronic ionizing circuit according to any preceding claims.

8. A hair-drier according to one or more of the preceding claims, effective to provide a cold, tepid or hot air flow, characterized in that it comprises an electronic device, operated by a switch or push-button, effective to generate an ion continuous flow, of fixed polarity and predetermined charge.

9. A hair-drier provided with a device for dissipating the electrostatic charges, according to the preceding claims and as described and illustrated for the intended objects.

Printed for Her Majesty's Stationary Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1981.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.